

- (a) obtaining, at radio frame intervals, complex time-domain response signals representing characteristics of propagation paths;
- (b) calculating absolute phase differences between the complex time-domain response signals that are selected;
- (c) calculating a mean value of the absolute phase differences over a plurality of radio frames; and
- (d) estimating Doppler frequency by dividing the mean value by ~~the~~ a time length of one of the radio frames.

22. (original) The method according to claim 21, wherein said ~~signal~~ obtaining step (a) calculates the complex time-domain response signals from known pilot symbols or synchronous channel signals which are multiplexed on each radio frame.

23. (original) The method according to claim 21, wherein said ~~difference~~ calculating step (b) comprises the substeps of:

- extracting a maximum complex time-domain response signal of an (n-1)th frame;
- identifying a time position of the extracted maximum complex time-domain response signal; and
- calculating an absolute phase difference between the maximum complex time-domain response signal of the (n-1)th frame and a complex time-domain response signal at the identified time position of an nth frame.

24. (original) The method according to claim 21, wherein said ~~difference~~ calculating step (b) comprises the substeps of:

- selecting one of the complex time-domain response signals;

identifying a time position of the selected complex time-domain response signal;
extracting complex time-domain response signals at the identified time position in consecutive radio frames; and
calculating absolute phase differences between the extracted complex time-domain response signals.

25. (original) The method according to claim 21, wherein said ~~difference~~ calculating step (b) comprises the substeps of:

calculating average power of complex time-domain response signals at each different time position over a plurality of frames within an averaging interval;
identifying a time position at which the average power hits a peak;
extracting complex time-domain response signals at the identified time position in consecutive radio frames; and
calculating absolute phase differences between the extracted complex time-domain response signals.

26. (original) The method according to claim 21, wherein:
the mobile station receives an OFDM-modulated signal; and
said ~~signal~~ obtaining step (a) comprises the substeps of:
estimating subcarrier channels for each radio frame, and
obtaining complex time-domain response signals by performing inverse Fourier transform on all the subcarrier channel estimates.

27. **(currently amended)** A method of estimating Doppler frequency that occurs in proportion to speed of a mobile station, the method comprising the steps of:

- (a) obtaining complex time-domain response signals from a received signal at radio frame intervals, the complex time-domain response signals representing characteristics of propagation paths, the received signal being affected by a frequency offset;
- (b) calculating signed phase differences and absolute phase differences between the complex time-domain response signals that are selected;
- (c) obtaining a first mean value by averaging the absolute phase differences over a plurality of radio frames;
- (d) obtaining a second mean value by averaging the signed phase differences over the plurality of radio frames;
- (e) estimating the frequency offset by dividing the second mean value by ~~the a~~ time length of one of the radio frames;
- (f) reducing effects of the frequency offset, based on the estimated frequency offset; and
- (g) estimating Doppler frequency by dividing the first mean value by the time length ~~of the radio frame~~.

28. (original) The method according to claim 27, wherein said ~~signal~~ obtaining step (a) calculates the complex time-domain response signals from known pilot symbols or synchronous channel signals which are multiplexed on each radio frame.

29. (original) The method according to claim 27, wherein said ~~difference~~ calculating step (b) comprises the substeps of:

- extracting a maximum complex time-domain response signal of an (n-1)th frame;
- identifying a time position of the extracted maximum complex time-domain response signal; and

calculating a signed phase difference and an absolute phase difference between the maximum complex time-domain response signal of the (n-1)th frame and a complex time-domain response signal at the identified time position of an nth frame.

30. (original) The method according to claim 27, wherein said ~~difference~~ calculating step (b) comprises the substeps of:

- selecting one of the complex time-domain response signals;
- identifying a time position of the selected complex time-domain response signal;
- extracting complex time-domain response signals at the identified time position in consecutive radio frames; and
- calculating signed phase differences and absolute phase differences between the extracted complex time-domain response signals.

31. (original) The method according to claim 27, wherein said ~~difference~~ calculating step (b) comprises the substeps of:

- calculating average power of complex time-domain response signals at each different time position over a plurality of frames within an averaging interval;
- identifying a time position at which the average power hits a peak;
- extracting complex time-domain response signals at the identified time position in consecutive radio frames; and
- calculating signed phase differences and absolute phase differences between the extracted complex time-domain response signals.

32. (original) The method according to claim 27, wherein:

- the mobile station receives an OFDM-modulated signal; and

said ~~signal~~ obtaining step (a) comprises the substeps of:

estimating subcarrier channels for each radio frame, and

obtaining complex time-domain response signals by performing inverse Fourier transform on all the subcarrier channel estimates.